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CONTRIBUTIONS TO THE ZOOLOGY OF TENNESSEE.  
No. 3, MAMMALS.

BY SAMUEL N. RHOADS.

In the following annotated list of the mammalia of Tennessee I have pursued the same plan of treatment as in the paper preceding this<sup>1</sup> on the avifauna of the same region. The list comprehends all the species known to belong to the Tennessee fauna, including not only the feral mammals now existing in the State but those which have been exterminated since the advent of the white man. An itinerary of the trip made during the months of May and June, 1895, when I secured the collection and field notes forming the basis of this paper, will be found on pages 376 to 381 of the Proceedings of the Academy of Natural Sciences of Philadelphia for 1895, and on the two following pages there is a brief *resumé* of the zoo-geography of Tennessee which may be of use to the more critical reader in this connection.

References to the mammals of Tennessee in scientific literature are so rare and, so far as I am able to search, are generally of so little value, that it would be useless to attempt to tabulate them in this paper. In popular literature the hunting stories of David Crockett form, perhaps, the most voluminous and reliable (?) source of earlier information on this topic, and these have been supplemented in later times by occasional papers and notes published in *Forest and Stream*. The historic literature of Tennessee, so far as I have read it, adds but little to the information which may be gleaned from literature devoted to the exploits of the aforementioned Crockett.<sup>2</sup> When taken from other sources the authority will be given.

Much of whatever value may attach to this contribution to our hitherto meagre knowledge of the mammals of Tennessee, especially the following notes on the habits of certain species, is due to the close observations and generous assistance of my friend Mr. B. C. Miles, of Brownsville, Tennessee, of whose labors in the ornithology of the same region I have already spoken in a previous paper.

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<sup>1</sup> Proc. Acad. Nat. Sci., Phila., 1895, pp. 463-501.

<sup>2</sup> With the exception of references to the buffalo, nearly all of which date from Haywood's Civil and Political History of Tennessee.

Other aid in the preparation of this paper will be duly acknowledged in its proper place. The order of families and genera here adopted is largely based on the classification of Flower and Lydderker in their recent work on the mammalia.

Order MARSUPIALIA.

Family DIDELPHYIDÆ.

Genus DIDELPHIS Linnæus.

1. *Didelphis marsupialis virginiana* (Kerr). Virginia Opossum.

I did not see this species, but it is accounted common all over the State below elevations of 2,000 feet. Mr. Miles says the negroes of Haywood and Lauderdale Counties claim two species, one with black, the other with white feet, but he thinks them identical. There is probably a tendency in the opossums of southwestern Tennessee to the Texan form, *D. m. californica*.

Order UNGULATA.

Family BOVIDÆ.

Genus BISON H. Smith.

2. *Bison bison* (L.). American Bison, Buffalo.

In his Monograph of The American Bisons<sup>3</sup> Dr. J. A. Allen presents us with nearly all that is obtainable in literature regarding the history of this animal in Tennessee. From these sources we know that they formerly passed over the Cumberland and Great Smoky mountain ranges by way of the Holston and French Broad Rivers, to and from the Valley of East Tennessee.

The number and frequency of these migrations, however, were not great, by far the larger number of buffalo being confined to the Cumberland Valley and its tributaries in Middle Tennessee and no mention being made of their occurrence in Western Tennessee.

The point of greatest abundance was undoubtedly in the "blue-grass region" of the vicinity of Nashville, especially about the salt and sulphur springs of Mansker's Creek, Madison's Lick, Lickton, etc., in Davidson County. Buffalo River is the most southwestern locality which appears to have been the haunt of this animal, and our authority for this rests solely on the traditional name. The same remarks apply to towns named Buffalo in Humphreys and Lawrence Counties, and seem to indicate that the bison ranged to a

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<sup>3</sup>Mem. Mus. Comp. Zool., Cambridge, Vol. IV., No. 10, pp. 92, 102, 112, 114.

greater or less extent along the southern boundaries of the State in this region. On the west Cumberland plateau, there is Buffalo Valley, in Putnam County, and in the Smoky Mountain range, a Buffalo Ridge in Washington County, and a place called Bison on the Pigeon River in Cocke County.

At the period of its earliest settlement, the hills and coves of the Allegheny Mountains in Tennessee, were in many places covered with large tracts of native grasses<sup>4</sup> which formed the pasture lands of herds of elk, and attracted, in summer, the bison from the lowlands.

The pristine condition of the country around Nashville may be gathered from the following quotation from Ramsey's Annals: "When the first settlers came to the Bluff [site of Nashville,] in 1779-'80, Haywood says the country had the appearance of one which had never before been cultivated. There was no sign of any cleared land nor other appearance of former cultivation. Nothing was presented to the eye but one large plain of woods and cane, frequented by buffalo, elk, deer, wolves, foxes and other animals suited to the climate. The lands adjoining the French Lick [at Nashville] which Mansker in 1769, when he first hunted there, called an old field, was a large open space frequented and trodden by buffaloes, whose large paths led to it from all parts of the country and there concentrated."

Numerous accounts from various sources indicate that the central basin of Tennessee and the blue-grass region of Kentucky, connecting therewith, were not inhabited by Indians when first discovered, but formed a sort of traditional game preserve and hunting ground upon which the hostile tribes of Chickasaws, Natchez, Creeks, Cherokees and Shawnees assembled at certain seasons, to hunt the buffalo and, incidentally, each other. In Ramsey (p. 193), we read that in the summer of 1777, Capt. De Membrune living at Easton's Station, near Nashville, "saw no Indians \* \* \* but immense numbers of buffaloes and other game." In February of the same year, it is stated that the same party "in their excursions had seen no Indians, but immense herds of buffaloes. One of their companions, William Bowen, had been overran by a gang of these animals and died from the bruises he received."

From "A short Description of the State of Tennessee," a booklet printed for Matthew Carey in 1796, the following paragraph may

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<sup>4</sup> Ramsey, Ann. of Tenn., 1853, p. 96.

be cited as showing the character of country, which formed the favorite buffalo range in the early days of Tennessee: "The land on the Cumberland and Tennessee Rivers is generally well timbered. In some places there are glades of rich land without timber, but these are not frequent or large \* \* \* The glades are covered with wild rye, buffalo grass and pea vine. \* \* \* The undergrowth in many places is cane 15 to 20 feet high, so close together as to exclude all other plants."

From the accounts in Haywood's History, we can gather that the buffaloes were not migratory in that latitude, but remained throughout the year. In 1779 a company of Watauga adventurers planted a field of corn on the present site of Nashville. "After the crop was made, Overhall, White and Swanson were left to keep the buffaloes out of the unenclosed fields of corn, while the rest of the party returned for their families." The abundance of these animals and other game in Middle Tennessee is proved by the following from Ramsey (p. 450). "Michael Stoner this year [1780], discovered Stoner's Lick and Stoner's Creek. The woods abounded in game, and the hunters procured a full supply of meat for the inhabitants by killing bears, buffalo and deer. A party of twenty men went up the Caney Fork as high as Flinn's Creek, and returned in canoes with their meat during the winter. In their hunting excursion they killed 105 bears, 75 buffaloes and more than 80 deer." This record is interesting, as it accounts for the naming of Buffalo Valley in the west end of Putnam County, and proves the former abundance of these animals in that and Smith County.

Regarding the presence of buffaloes in East Tennessee we have fewer and less definite records. Ramsey tells us, (p. 69) that in 1764, "Daniel Boon, who still lived in the Yadkin \* \* \* came again this year [to Tennessee and Kentucky] to explore the country—Callaway [his hunting companion] was at the side of Boon, when approaching the spurs of the Cumberland Mountain and in view of the vast herds of buffalo grazing in the vallies between them, he exclaimed, 'I am richer than the man mentioned in scripture, who owned the cattle on a thousand hills—I own the wild beasts of more than a thousand vallies.'"

In other places we read that the route taken by explorers from North Carolina and Virginia to the Cumberland River valley was by way of Cumberland Gap, which lies on the boundary between Claiborne County, Tennessee and Bell County, Kentucky. There

is little doubt that from some commanding point in that locality, Boon made these observations, and that they related to both the States upon whose common boundary line he then stood.

While at Allardt on the high plateau of Fentress County, I conversed with Mr. Bruno Gernt, who stated that he had heard from old residents in that country that buffaloes once abounded in the Obey River valleys of Fentress and Overton Counties. Writing to Mr. Gernt for more definite information, he referred me to other gentlemen on the subject who have failed to respond to my letters. Mr. Gernt says, however, he is informed that an old resident, now dead, named John Young, killed the last buffalo in Fentress County but he does not give the date of its capture.

In West Tennessee the buffalo seems to have been unknown, so far at least, as history, tradition or remains have given evidence. This condition of affairs, if a fact, seems unaccountable from a faunal or geographical standpoint, as the flora of much of this division of the State is almost precisely like that of the east bank of the Tennessee River, which was frequented by buffaloes. That the river could form any great barrier to the passage of this animal from Middle to West Tennessee is not credible, when we remember that they had already crossed the Cumberland, and have been known to swim waters even more formidable in the valleys of the Missouri and Red River during their migrations.

The absolute silence of Davy Crockett on this subject, is very significant proof of the absence of the buffalo on the western border of the State. Mr. Miles thus comments on the matter: "I have often thought of and asked in the last forty years about buffaloes in this section; never met any one who ever heard of a buffalo here, or saw indications that they ever were. \* \* \* Blue grass is not indigenous to our section and I doubt if buffaloes were ever numerous here as in Kentucky and Middle Tennessee, though certainly there must have been isolated specimens. I never heard of the remains of one, nor did they have *roads* or *wallows*, which the only writers on Kentucky and Middle Tennessee tell of."

The reader is referred to later remarks on the elk for reference to the bisons once kept on the Belle Meade farm by General Harding.

#### Family CERVIDÆ.

Genus DORCELAPHUS Gloger.

#### 3. *Dorcelaphus virginianus* (Bodd.). Virginia Deer.

When we consider the large amount of wild land in the three

main divisions of the State, it is surprising how effectually the Virginia Deer has been exterminated over the greater part of Tennessee. This is probably owing largely to the number of negroes and "poor whites," who infest these districts, and spend their lives in the uncertain pursuit of hunting, rather than in earning an honest livelihood.

A few remain in wilder parts of the Cumberland table-land, but even there they are rarely taken. I found their fresh track on the bluffs near Sawyer's Springs. Mr. Miles refers to them in his vicinity as follows: "In my county, [Haywood] as far as I can gather, there are about 20 [wild ones] now alive—one buck was killed in February and a doe in August. \* \* \* We are making a desperate effort to restore this animal, and I think, with the sentiment now prevailing, will make a success of it." Mr. Ragsdale, proprietor of Cloudland Hotel, thinks the deer have been extirpated from Roan Mountain and that one would have to go many miles into the mountain valleys of North Carolina to find them.

Mr. A. B. Wingfield, in *Forest and Stream* for December 14th, 1894, states "The Cumberland Mountain range has been almost entirely depleted of its stock of deer. Would you believe it if I were to tell you that last year there were 248 carcasses of deer shipped from the small town of Crossville in Cumberland County \* \* \* I am glad to report that the last Tennessee legislature passed a law forbidding the killing of deer in five of our mountain counties (Cumberland, Claiborne, Scott, Morgan and Anderson) for a period of five years."

Genus **CERVUS** Linnæus.

4. *Cervus canadensis* (Ersl.). Wapiti or Elk.

At the beginning of the present century, this noble animal was probably a visitant to every county in the State. It not only abounded in the high passes and coves of the southern Alleghenies; but, associated with the buffalo, it frequented the licks near the present site of Nashville, gave its name to some of the rivers and creeks of the southern counties of Middle Tennessee, and roamed through the glades and canebrakes of the Mississippi bottoms. The redoubtable Crockett, during his residence in Obion and Dyer Counties, gives repeated instances of the occurrence of the Wapiti in the bottom lands, and it formed no small part of his larder in the period between the years 1820 and 1830.

Mr. Miles, after careful inquiry about the elk in his region writes me, "The last elk killed in West Tennessee that I can learn of was at Reelfoot Lake about 1849. The late David Merriwether of Madison County, Tennessee, killed it. In 1865 I heard that an elk was killed in Obion County."

In Putnam's History of Middle Tennessee, (page 127), there is a foot-note which states that on the famous Belle Meade farm, south of Nashville, General William G. Harding had "two hundred deer, twenty buffaloes and half dozen elk" in captivity. I understood in a conversation with gentlemen in Nashville, that these animals had come of native Tennessee stock, and that their descendants had been kept in this park until a recent date. Putnam's note applied to a period anterior to the year 1859. I have been unable to get any direct information from the Harding or Jackson families, now living at Belle Meade, as to these facts, or whether the elk and bison are still existing in their preserve.

#### Order RODENTIA.

#### Family LEPORIDÆ.

##### Genus LEPUS Linnæus.

##### 5. *Lepus aquaticus* (Bachm.). Aquatic Hare.

On the borders of Reelfoot Lake, in the closest proximity to the water, I found this large hare. It preferred hiding among the half-submerged vegetation and piles of driftwood, and when it broke cover would run with bold, high leaps from log to log for so great a distance that it was difficult to find it again.

The following, relating to its habits in the vicinity of Brownsville, is from the pen of Mr. Miles: "Though resembling the Cotton Tail closely in color and in diet, as well as in movements, there the similarity of the Swamp Rabbit, as we term him, ends. Never seen on the hills and seldom in the open, he is at home in the canebrakes and deep woods, far from the homes of man. The more desolate the situation, the more certain he is to be found, ever wide awake and ready to test his speed and cunning with that of any enemy; and he has no friends. In the overflow [spring freshets] I have seen him for hours seated on a floating log, as much at home as a raccoon, and when disturbed take the water for a 300 yard swim as readily as any land animal that I know. When hotly pursued, he always takes the water, and, once there, I have never seen him caught. Twice only, while hunting at night, have I seen



him take a hollow tree, seeming generally not to resort to such a refuge in the day. The young are born with eyes closed and without hair, and fewer in number than the cottontail.<sup>5</sup> I have only seen one nest, that in an old root. The Swamp Rabbit has fully held his own in numbers in my day, though nothing more, and I see about one specimen a day when hunting in our deepest bottoms. The largest specimen I ever weighed was thirteen pounds, and would say thirteen inches at the shoulders. Negroes think him good eating, and if properly prepared, I agree with them."

In another letter Mr. Miles again refers to this hare, as follows: "As to the aquatic habits of the Swamp Rabbit, they are very pronounced and he will take to water as readily as the raccoon. I have seen him when not pursued swim a slough 30 yards wide and shake himself when on the other side, hopping off as though it was all right \* \* \* I saw one swim several hundred yards down and across current when pursued by my pointer, and the dog did not gain on him, but was the most exhausted of the two when he gave up the chase. The rabbit makes the 'dog lick' when in the water, the rump rising and falling as in the swimming horse."

Specimen—Samburg, 1.

6. *Lepus sylvaticus* Bachm. Wood Hare.

In western Tennessee, especially in the woods and thickets skirting the cane-bottoms near the Mississippi, this hare has almost become a nuisance on account of its abundance. Near Brownsville, Mr. Miles declares the "Cotton-tail is nearly a pest with us, and since 20 years has increased fully 50 per cent. in my opinion, and this in spite of the fact that its young are destroyed by nearly everybody and thing. \* \* \* During February last [1895] I could number 100 parties who killed in a single day's hunt 100 each, and the same ratio was kept up during the month; this too at the time of breeding, but there are apparently as many as ever and in the corporation of Brownsville, they eat up a large per cent of the gardens."

At Reelfoot Lake I found them very abundant, their range in the lowlands overlapping that of the Water Hare. In the uplands I rarely met with them. None were obtained in Middle Tennessee or

<sup>5</sup> Mr. Miles contrasts this condition of the young at birth with that of *Lepus sylvaticus*, which he states are brought forth "with eyes open and fully haired."

East Tennessee. Those from West Tennessee apparently resemble *sylvaticus* from Pennsylvania and New Jersey, but not having summer skins from the Eastern States, the determination is unsatisfactory. Mr. Bangs<sup>6</sup> identified three winter specimens from Trenton (Gibson Co.?) Tennessee, as "perfect intermediates between *sylvaticus* and *mearnsi*, both in size and color."

Regarding the possible occurrence of *L. sylvaticus transitionalis* Bangs, in the Great Smoky Mountains, its describer writes me: "I examined a large series last winter from Roan Mountain, and they were all true *sylvaticus*."

Specimens—Samburg, 5; Raleigh, 1.

Genus **SYNAPTOMYS** Baird.

7. *Synaptomys cooperi* Baird. Lemming Vole.

Six specimens, a lately nursing female and five young, the latter apparently belonging to a single litter, and the former probably their parent, were trapped in a small, springy place on the Carolina side of the summit of Roan Mountain, where a quantity of their favorite tussock rush, *Juncus*, was growing. The adult is indistinguishable from Massachusetts and Pennsylvania specimens. The young are of much interest, no record or description of immature specimens having yet been published, to my knowledge. They are about half grown, their average measurements being, total length, 85 millimeters; tail vertebræ, 13; hind-foot, 18.5. Above, including the sides, they present a uniform blackish gray shade, which close examination detects to be obscurely mixed with dull wood brown. The prevailing hue is due to the long and very numerous dull black hairs, which are sparingly mingled with gray ones, and the faint brown shade arises from the exposed subterminal bands of the shorter fur which underlies the longer and coarser black hairs. The under parts are darker, but otherwise resemble those of the adult specimen. In the young skull the length of the upper molar series is nearly as great as in the adult skulls of twice the size, five millimeters longer. The incisors on the contrary, correlate in size with the relative bulk of old and young, those of the latter in this case being about half the caliber of the former. The sulcus of the upper incisors, which characterizes this genus so strongly in adults, is a nearly obsolete depression in the young and not more easily detected than in occasional specimens of *Microtus pennsylvanicus* which continue to exhibit this persistent index of their

<sup>6</sup> Proc. Bos. Soc. N. Hist., 1895, p. 409.

ancestry. On cutting away the premaxillary the exposed base of the incisor shows a constant increase in the development of the lateral sulcus, so that at its root the tooth may be said to be almost as characteristically grooved as in the adult. In the half-grown skull the cutting edges of the upper incisors are oblique, forming an acute angle in each at their median line; in the adult skull this obliquity is reversed, the outer sides of the teeth being longer than the inner. In the young, the alveolar breadth of the incisor exceeds its terminal breadth; in the old these dimensions are equal. The incisive foramina are wider and shorter, and the upper molar series more widely separated by the bony palate and maxillaries, than in old adults. The crown structure of the molars in young and old is identical, their only difference being due to the amount of wear, shown most conspicuously in the posterior upper molar, which has not protruded sufficiently to bring its posterior loop down to the triturating plane, and in consequence, that section retains its original cuspidate form.

All of the five young have white-tipped hind feet almost precisely like the young *Evotomys* taken in the same locality. This peculiarity, is not confined to the young of these genera. An examination of my series from the United States and Canada shows that several young and some of the old among four species have the hind feet so marked. In an adult *Evotomys gapperi* from Pennsylvania, both fore and hind feet are nearly pure white and in *E. g. saturatus* from Mt. Baker, B. C., all four feet, and the throat and the breast are similarly pied. Such cases are rare in my very large series of *M. pennsylvanicus*. It is an interesting question why *Synaptomys* and *Evotomys* should show this tendency to pedal albinism, while in *Peromyscus* and *Zapus* the same kind of variation seems confined to the tail. Indeed, in some of these instances this feature has almost assumed the dignity of a diagnostic if not specific character, and it may even be conjectured whether these white-footed voles do not foreshadow color patterns, which are destined to figure in the days to come. On the other hand it may indicate their past connection with some harlequin ancestry, such as has given us the variegated pelage of the Arctic Lemmings.

Specimens—Roan Mt., Mitchell Co., N. C. 1 ad.; 5 juv.

**Genus MICROTUS** Schrank.

**8. *Microtus pennsylvanicus* (Ord).** Wilson's Meadow Vole.

The most careful search and systematic trapping failed to reveal the presence of this common eastern and northern quadruped in any

part of Tennessee west of the Great Smoky Mountains. In this respect its distribution, or rather its absence, corresponded exactly with that of the Song Sparrow, *Melospiza fasciata*. Wherever I found the supposed runways of this vole, the traps only yielded the Mole Shrew, *Blarina brevicauda* and the Pine Vole, *M. pinetorum* and even these in such small numbers that the residents of the State may well congratulate themselves on their immunity from these little pests.

On the summit of Roan Mountain two specimens of the Meadow Vole were secured in a little "bulrush" swamp below Cloudland hotel, about 100 yards from the Tennessee line in Mitchell County, N. Carolina. No specimens were taken in Tennessee, but I feel justified in including it here, not only on this nearby record, but because similar runways to those in which the Mitchell County specimens were taken were observed in swampy ground near the summit of the mountain in Carter County, Tennessee, during my ascent thither from the Doe River ravine.

There is not the slightest tendency toward any variation in the Roan Mountain specimens from those found near Philadelphia at the same season, and this is good proof that the distribution of this vole is continuous along the ridge of the southern Alleghenies and much farther south than in the adjoining lowlands.

Specimens—Roan Mountain, Mitchell Co., N. Carolina (6,300 ft.), 2 ♂ s.

9. *Microtus pinetorum* (LeC.). Pine-woods Vole.

This seems to be the only representative of the *Microtinæ* in Western and Middle Tennessee. It may be said to be numerous in the woods and their vicinity, forming tunnels in edges of open grass fields, much after the manner of Wilson's Vole. None were taken east of the valley of East Tennessee. The seventeen specimens from Tennessee show no characters which are not to be found in specimens from Pennsylvania, New Jersey and Connecticut. Those from Samburg, however, are more uniformly dark beneath, the silvery sheen seen in eastern specimens being clouded, in Reelfoot Lake examples, by muddy brown over the entire underparts. The same may be said of those from Raleigh and Bellevue, while those from East Tennessee are similar to Pennsylvania skins. It may be remarked that while the Pine Vole shows great constancy in its characters over a large region included between and almost overlapping the Austroriparian and Alleghenian faunæ, the most

southern and most northern extremes in the east show color differences which may eventually be recognized as subspecific. Examples of this variation may be found in comparing a series from the mountains of northern New Jersey with samples from the pine barrens of the southern part of that State. The former are blackish-brown above and plumbeous gray beneath, the latter rusty brown with silvery gray sides and underparts.

Specimens—Samburg, 8; Raleigh, 6; Bellevue, 2; Harriman, 2.

**Genus EVOTOMYS** Coues.

**10. *Evotomys carolinensis*** Merriam. Carolina Wood Vole.

My only specimens of this large and interesting woodland mouse, which Dr. Merriam discovered on Roan Mountain in 1877, are not much more than half-grown, and all of them were trapped in the border of the fir belt just below Cloudland Hotel, in Mitchell County, N. Carolina, two of the specimens being taken within forty yards of the Tennessee strip. Though their runways were abundant there, a strange fate prevented my securing any specimens on Tennessee soil. In my four young specimens the color is much darker than in *gapperi* of the same age, corresponding very closely to the shade characterizing *E. g. suturatus* of the northwest. In the oldest specimen the hoary appearance of the belly is untinged with fulvous; the others are plumbeous, with a scant mixture of gray and ochre. In all the specimens the claws of the three middle hind toes are each covered with a sheath or brush of white, bristly hairs, which exceed the claws in length and project beyond them.

Contrary to my expectations, the Wood Vole of Roan Mountain was not found in wet places but seemed to prefer rather open runways among the fallen logs, moss and ferns on the borders of the forest, and one specimen was taken under the shelter of a pigpen, just below the hotel. Such situations were preferred to the depths of the forest, owing to the variety of edible grasses and weeds only found in clearings. Dr. Merriam writes me that he has specimens taken on the Tennessee side of Roan Mountain.

Specimens—Roan Mt., Mitchell Co., N. C., 3.

**Genus FIBER** Cuvier.

**11. *Fiber zibethicus*** (L.). Muskrat.

Owing to high water in the rivers during my visit I was unable to reach the mussel shoals and collect specimens of the Unionidæ of many streams in Tennessee. This difficulty was largely remedied

by the industry of the muskrats inhabiting every large stream in my course and whose diet seemed to consist very largely of these mollusks, which they would collect and deposit on logs by the margin of the water. When the mussel dies, the valves of the shells relax and the muskrat devours the contents, dropping the shells into the water. In some places I found many bushels of these shells representing ten or fifteen species and three genera in one dumping place, and was able to get a much better representation of this part of the mollusk fauna in an hour than would have been possible in a day's dredging or wading. In a fish-dam on the Holston River, near its junction with the French Broad, I found these shells wedged among the stones by the rats, and among them some newly-devoured specimens of the beautiful freshwater shell *Io spinosa*. The species most preferred in the Tennessee River was a small clam-like, thick-shelled and corrugated *Unio*, and it was noticeable that the same species was by far the most numerous in the shell-heaps of the Cherokees on the river banks. It was rare to find even the most fragile species in these rat-larders broken, as if opened forcibly by the rats, a condition the reverse of those obtained in similar deposits east of the Alleghenies.

**Genus PEROMYSCUS** Gloger.

**12. *Peromyscus leucopus* (Raf.).** Deer Mouse.

Compared with specimens from eastern Pennsylvania and New Jersey there appears to be nothing to distinguish the upland Deer Mice of West and Middle Tennessee from typical *leucopus*. No specimens of this genus were taken in the lowlands of East Tennessee, but from our knowledge of the fauna of that region it is quite certain that the same species is the prevailing form there, associated in certain localities with the Golden Mouse, *P. aureolus*. I found this species numerous at Raleigh. A few were taken at Samburg, where they seemed to frequent the intermediate grounds between the overflowed bottoms and the bluff, and at this point their habitat overlapped somewhat that of the large Cane Mouse, *P. gossypinus mississippiensis*, described below.

Two specimens taken at the entrance of Mammoth Cave, Kentucky, are identical with those from West Tennessee.

Specimens—Samburg 6; Raleigh, 8; Bellevue, 1.

**13. *Peromyscus leucopus nubiterræ*.** Cloudland Deer Mouse.

Subsp. nov. Type, ad. ♂, No. 3,664, Coll. of Acad. Nat. Sci.,

Phila. Col. by S. N. Rhoads on summit of Roan Mountain (6,370 ft.), Mitchell Co., N. Carolina, June 19, 1895.

Description.—Size smaller than *P. leucopus*, with much longer tail and darker coloration.

Colors, above, blackish-brown or cinnamon with a broad, strongly defined, black, vertebral stripe from middle crown to base of tail. Sides of nose and a wide space around eyes, sooty. Ears dusky. Hair of underparts sooty at base, scarce concealed on parts of legs, throat and belly by the pure white tips. Tail sooty-brown above, white beneath, quite thickly clothed with long hairs which lengthen into a pronounced pencil at tip. Skull smaller than in *leucopus*, otherwise very similar.

Measurements (of type in millimeters).—Total length, 170; tail vertebræ, 87; hind foot, 20.5. Skull: total length, 23.8; basilar, length, 18; zygomatic expansion, 13; interorbital constriction, 4; length of nasals, 9.6; length of mandible, 12.3; breadth of mandible, 6. Average measurements of four adults from the same locality: total length, 167; tail vertebræ, 86; hind foot, 21.5.

The Cloudland Deer Mouse seems to be exclusively a dweller of the balsam or spruce belt which crowns the summit of Roan Mountain, and is undoubtedly found on all the summits of the southern Alleghenies, which rise above an altitude of 5,000 feet. That it intergrades with *leucopus* of the lowlands, a total lack of specimens from intermediate localities prevents me from determining.

In a superficial comparison of *nubiterræ* with typical *leucopus*, the smaller size, sooty color and very long tail immediately suggest a specific difference, but the cranial features of the two do not support such a conclusion. In all respects, except coloration and size, the Roan Mountain animal is an interesting counterpart of the *Peromyscus leucopus canadensis*, so fully described by Mr. G.S. Miller, Jr.<sup>7</sup> The differentiation of these two forms from *leucopus* has been on very similar lines, owing to the similarity of the climatic conditions affecting them. Their dissimilarity, on the other hand, is exactly correlated with the difference in the humidity and mean temperature of the balsam forests of Canada and those of the Great Smoky Mountains.

Specimens—Roan Mountain (5,500 to 6,300 ft.), Mitchell Co., N. Carolina, 6; Carter Co., Tenn., 2.

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<sup>7</sup> Proc. Biol. Soc., Wash., Vol. VIII, 1893, pp. 55-70.

**14. *Peromyscus gossypinus mississippiensis*. Cane Mouse.**

Subsp. nov. Type, ad. ♂; No. 3,729, Coll. Acad. Nat. Sci., Phila. Col. by S. N. Rhoads at Samburg, Obion Co., Tennessee, May 4, 1895.

Description—Larger than *gossypinus*, with much longer hind feet, relatively longer tail, lighter, grayish-fulvous coloration and lacking the dark orbital ring.

Color above, yellowish-brown, more fulvous along sides, darker along back and mixed with blackish.

Lower parts and feet, white, shaded by the plumbeous exposed bases of hairs on chest, belly and thighs.

Measurements (of type in millimeters).—Total length, 182; tail vertebræ, 77; hind foot, 24.5; ear (from crown, dry skin), 12. Skull: total length, 29; basilar length, 21.8; zygomatic expansion, 14.7; interorbital constriction, 4.5; length of nasals, 11.2; length of mandible, 15.2; greatest width of mandible, 7. Average measurements of five adults from same locality: total length, 182; tail vertebræ, 80.6; hind foot, 24; average total length of five skulls, 28; average zygomatic breadth of same, 14.5.

So far as I have made its acquaintance in Tennessee, the Cane Mouse is solely a denizen of the "bottom lands" of the Mississippi. At Samburg it confined its wanderings very closely to the immediate vicinity of Reelfoot Lake, and was abundant in the dense forest jungle that bordered its margin, seeming to prefer the lowest and wettest parts of the overflowed lands, from which, at that time of the year (May), the waters of the lake had receded. It is quite distinct from the common upland Deer Mouse of the same region, and the upper and lower borders of their habitats overlap sufficiently to make it possible to capture both species in the same trap.

A comparison of the Samburg mice with *leucopus* of the same locality having shown their differences, as above stated, to be specific, the question at once arises as to their relations to other southern *Peromyscus* of the Eastern States. I can find nothing, in examining the series before me, to separate these Cane Mice specifically from *gossypinus* of Florida and Louisiana, and of which I am so fortunate as to have a large collection, those from Louisiana being generously loaned me by Mr. Outram Bangs. The Louisiana specimens are of interest as showing the extension of *gossypinus* along the Gulf Coast across the Mississippi River. A comparison of some of these from near New Orleans with specimens from the west coast



of Florida shows a great similarity, the former averaging darker and smaller but the variation is perhaps too slight to warrant recognition. On the other hand, the Tennessee form represents the maximum development of *gossypinus*, combined with a light coloration which together render it easily distinguishable as a subspecies.

The relation of eastern *gossypinus* to *leucopus* has been a question frequently discussed by mammalogists, but the lack of good material from regions intermediate between N. Carolina and Florida has prevented any final determination. I had hoped to obtain the desired series from the regions in question in order to intelligently discuss the matter now brought forward in West Tennessee, but a correspondence with our more prominent collectors of eastern mammals, including Messrs. Miller, Bangs and Brimley, shows that we are but little better off in this regard than thirty years ago, unless collections of the U. S. Dep. of Agriculture contain such series. I am, therefore, only able to predict, on the basis of the relationships of *gossypinus* and *leucopus* of the lower Mississippi Valley, that they will prove to be as distinct species in the east as in the west. In this connection the *cognatus* of Leconte again intrudes itself. Leconte states Georgia and South Carolina to be the type localities of this species. Dr. Coues declares<sup>8</sup> that "three dried specimens, labelled '*cognatus*' in what we presume to be Major Leconte's own handwriting, as it is the same as that upon his other types now in our possession," should be considered the types of *cognatus*. One of these, from Illinois, Dr. Coues says is "*H. michiganensis* pure and simple!" and adds, "The other two, Nos. 4,708, 4,709 are not marked for locality but probably came from Ohio, Wisconsin or Michigan, and are really his types!" It is very difficult to reconcile this statement with Leconte's assertion that *cognatus* is a native of Georgia, and if these two specimens really are original types of *cognatus*, it is far more reasonable to assign them to Georgia or South Carolina. On this basis, Dr. Coues' diagnosis of "Nos. 4,708, 4,709," viz., that "They are exactly the size of ordinary *leucopus*, the tail a little shorter, relatively, than the average of *leucopus*, but not shorter than is often found in *leucopus*, and they are colored exactly as in *gossypinus*, the upper parts being very dark, the under impure white, and the tail indistinctly bicolor," strongly points to the conclusion which Prof. Baird and Dr. J. A. Allen have advanced, that *cognatus* is a synonym of *gossypinus*, based, I might

<sup>8</sup> Mon. N. A. Rodentia, pp. 77, 78.

add, on a somewhat immature specimen of that species from near the same type locality. It is very probable that Leconte's positive statement, in his introductory paragraph to the description of *cognatus*, that he had never, during a long period of residence in Georgia, seen *leucopus* there, will be confirmed by future investigators.

Another species whose status is affected by the foregoing remarks is *Peromyscus megacephalus* of northern Alabama. Not having secured a series from that region I am unable to throw any light on the question of the affinity of this species to *gossypinus*, to which it is most closely related, and indeed it may be found to be only a case of aberrant and extraordinary individual variation from typical *gossypinus*, or may represent a mountain or foot-hill race of that species. In either case the validity of *megacephalus* nowise affects the status of *mississippiensis*, which represents the modifications of an environment quite the reverse of that obtaining in northeastern Alabama.

Specimens—Samburg, 16 ; Raleigh, 1.

15. *Peromyscus aureolus* (Aud. & Bach.). Golden Mouse.

Prof. Baird, in his great work on the North American Mammalia (p. 468), tabulates two specimens of this mouse which were taken near Knoxville, Tennessee, by Prof. J. B. Mitchell and presented to the Smithsonian Institution. Dr. Coues, in the Monograph of North American Rodentia, specially refers to one of these specimens as typical of the peculiar coloration of *aureolus*, so we may reasonably accept the identification and the record as the first for the State. Dr. C. H. Merriam writes me that his assistant, Mr. H. C. Oberholser obtained one of these mice at Roan Mountain Station. In view of these Tennessee records, which would indicate the presence of the Golden Mouse over the greater part of the State, it seems strange that I did not meet with it, although the Deer Mouse was taken in considerable numbers. The elevation of Roan Mountain Station is about 2,500 feet. Messrs. H. H. and C. S. Brimley inform me that they have received numbers of this mouse taken by J. S. Cairns near Weaverville, N. Carolina, about 25 miles east of the Tennessee line, at 2,300 ft. elevation, so it is reasonable to expect them in any of the passes of the Great Smoky Mountains below that altitude.

**Genus NEOTOMA** Say & Ord.**16. *Neotoma magister*** Baird. Allegheny Cave Rat.

This large mountain-dwelling rat is found in the cliffs of Roan Mountain and other peaks of the Southern Alleghenies. I have no records of it from the Tennessee section of the mountain but the natives of Carter County do not state that it shows a decided partiality to North Carolina.

A careful examination of the cave deposits which came into my hands from Middle Tennessee failed to show any remains of this genus.

I have examined specimens of the rat which frequents Mammoth Cave, Kentucky, and am unable to detect any difference between them and those taken in Clinton and Cumberland Counties, Pennsylvania. The skull of an old specimen forwarded to me alive from Mammoth Cave is exactly like the largest adult skulls of fossilized specimens from the limestone caves of eastern Pennsylvania.

After particular inquiry among the hunters of southwestern Tennessee as to the existence of a Wood Rat in those parts I am inclined to think that it has been noted there, but the confusion of *Neotoma floridana* with the Old World rats of these parts makes the evidence of questionable value.

**Genus MUS** Linnæus.**17. *Mus decumanus*** Pallas. Norway Rat.**18. *Mus rattus*** L. Black Rat.

Mr. Miles mentions the former occurrence of the Black Rat in West Tennessee but he has not seen it for twenty years. The Norway Rat, however, has not been exterminated so successfully, as the open streets of the larger cities of Tennessee can frequently testify.

**19. *Mus musculus*** L. House Mouse.

Found both wild and semi-domesticated.

Specimens—Raleigh, 1; Roan Mountain, 1.

**Family CASTORIDÆ.****Genus CASTOR** Linnæus.**20. *Castor fiber canadensis*** (Kuhl). American Beaver.

In company with a trapper, I visited a beaver house in Reelfoot Lake. This was situated in a cypress swamp called the "Turkey-roost," about three miles west of Samburg. It was not tenanted, but there were signs that a beaver had been at work there within a

few days. Other lodges were known to my guide, and Mr. H. B. Young of Samburg, who makes it his business to take some of these animals in the lake every winter, declared there were twenty of them left, and contracted with me to furnish the gardens of the Zoological Society of Philadelphia with some of their young ones the coming winter.

Mr. Miles says, "the beaver, in limited numbers, has been here always and is more numerous now than 40 years ago, because less hunted. Within 9 miles of Brownsville, I know personally of a 'house' now inhabited, and it has been so for 25 years. I know the locality of two others by report."

It is not likely that any beavers now exist in the eastern half of the State, though their former distribution over the whole of Tennessee is well known, and attested by the frequency of the name for smaller streams and meadows throughout the state.

#### Family SCIURIDÆ.

##### Genus ARCTOMYS Schreber.

#### 21. *Arctomys monax* (L.). Woodchuck. Ground Hog.

Stated by Mr. Miles to be "very rare" in Haywood Co. A burrow, apparently used by one of these animals, was located on the banks of Indian Creek just above the overflow of Reelfoot Lake. From the character of the signs and paths leading from this den to an adjacent field, it could have belonged to no other animal. I did not find the woodchuck as numerous anywhere in Tennessee as we have it in eastern Pennsylvania. It is found high up among the Great Smoky Mountains, but does not, so far as I could learn, invade the fir belt, which occupies their summits down to an altitude of about 5,000 feet. Dr. Merriam says<sup>9</sup> of them in this region that they "were common in places in the Alleghenian belt, about half-way up the mountains."

##### Genus TAMIAS Illiger.

#### 22. *Tamias striatus* (L.). Eastern Chipmunk.

This Ground Squirrel was very abundant on that part of Roan Mountain lying between the station and the foot of the fir belt. A few casually invade this belt, but never to a great distance. In the lowlands of Tennessee, the chipmunk was very sparingly and irregularly distributed, so far as my personal observations were made,

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<sup>9</sup> Amer. Jour. Sci., 1888, p. 459.

but I was frequently informed they were often seen in districts where none appeared during my visit. I saw them at Johnson City, Greenville and Nashville, and heard one or two while riding through the woods in Obion Co., near Samburg. They are to be found near the Springs at Raleigh and on the road from Raleigh to Bartlett. None were seen at Chattanooga or Knoxville, nor on the Cumberland plateau. Two specimens from Roan Mountain are precisely like some of my skins from southern New Jersey.

Mr. Miles speaks of them near Brownsville as being "identical with the chipmunk of Virginia in color, though, I think, larger and not near so plentiful. \* \* \* \* I see five or six every summer." The Messrs. Brimley of Raleigh, N. C., record two specimens taken at Warner, Hickman Co., Tenn., in November and December, indicating that the hibernation of this animal in that latitude is of short and irregular duration.

Genus **SCIURUS** Linnæus.

23. *Sciurus niger ludovicianus* (Custis). Western Fox Squirrel.

We do not find this species numerous except in the heavily timbered bottoms of West Tennessee, more especially west of the Tennessee River in the direct drainage of the Mississippi.

A very interesting account of this species, as observed in Haywood and Lauderdale Counties by my veteran friend and sportsman, B. C. Miles, is too valuable to be lost, and with some emendations, I give it here: "The Fox or Red Squirrel is the largest of all the tribe and varies considerably in size in different neighborhoods. Wherever food to his liking is found, there he is, and always a glutton, putting in his whole time eating, drinking, or snoozing on a cozy limb, in such a position that he attracts attention, neither of the hunter below nor of the hawk above. I am certain I have seen him clean up a quart of mulberries in a half-day and not move ten feet during the time, nor give utterance to a single sound. Early in the morning and late in the evening he chatters much and can even condescend to be a little gay in the mating season. I doubt his ever migrating, as do the gray and black, though an excursion of a mile from home through cultivated fields and small timber is no unusual tramp for the gentleman.

"He is a denizen of big timber always: more at home in the gums and cypresses of our swamps than elsewhere, though he is not infrequently found in the most unexpected places, on the hills near

the house, or in the garden, where he goes for fruit. Of all the tribe he is the greatest eater of berries and the like, and I have even known of his scratching sweet potatoes out of the ground and making a dinner off one of half a pound weight.

"When closely hunted he is very much more wary than the Gray Squirrel and the way he can hug a limb and spread himself out flat on the bark is truly artistic. In his movements he is the very acme of animated silence, seeming at all times to fear a noise and it is not an infrequent ruse of hunters, by making a great outcry, to scare him from a secure hiding place. As a table game he is much inferior to his gray relation, being tougher, and the very red bones always give an uncanny appearance to the dish, cook it as you may. \* \* \* \* As a caged pet he is dull, gets over-fat, becomes stupid, is ill-natured, has no gloss to his hair and is a dismal failure. He is bravest of the tribe, often refusing to leave the ground when pursued by a small dog; has been seen to stand at bay and hold off such. Rarely he mates with the Gray Squirrel, when the produce is called a 'ferrydiddle.' I have killed two such in my forty years of squirrel hunting. One at all familiar with the two species would at once recognize its hybrid origin."

Referring to the black phase of this squirrel, Mr. Miles says: "I never saw any blacks save those like the Fox squirrel. Have seen two killed in this county, but when in Memphis, in 1871-'74, my uncle frequently purchased Black Squirrels in the markets. We understood they came from Mississippi (never from Arkansas), 10 or 20 miles below Memphis, and we both thought them a distinct species; no resemblance to Fox Squirrel save in size and that the tip of the nose in each is gray. Have frequently observed that the bones of Black Squirrel were the same color (violet) as in the Gray Squirrel, while the bones of Fox Squirrel were invariably a deep salmon or red when brought to table. \* \* \* \* I never saw or heard of the black phase of Gray Squirrel save through you."

Specimen—Samburg, 1.

**24. ? *Sciurus niger cinereus* (L.). Northern Fox Squirrel.**

I base the admission of this subspecies to the list, first, on evidence from hunters of the Great Smoky Mountains that the Fox Squirrel is found there, and secondly, because Dr. J. A. Allen includes the Southern Alleghenies in the geographical distribution of this form.

**25. *Sciurus carolinensis pennsylvanicus* (Ord).** Northern Gray Squirrel.

Typical examples of this squirrel are confined to the high mountains of the extreme eastern part of the State. From thence westward there will be found to be a gradual transition to the form, peculiar to the bottom lands of the Mississippi, which is next considered. I saw hunter's skins of the Gray Squirrel, taken at an elevation of 4,000 feet on Roan Mountain. It is not common in the more settled parts of Middle Tennessee.

**26. *Sciurus carolinensis fuliginosus* (Bachm.).** Louisiana Gray Squirrel.

Mr. Outram Bangs has revived<sup>10</sup> the Sooty Gray Squirrel of Louisiana, described by Bachman under the name *fuliginosus*, as a valid subspecies of *carolinensis*. I was able to make close examination of a number of live Gray Squirrels in the city park at Memphis, where they have become domesticated and form one of the chief attractions to the large number of people who frequent this thoroughfare. These squirrels averaged fully up to the size of the northern Gray Squirrel of Pennsylvania and were distinctly darker than the eastern animal, so much so, in fact, that I attributed their sooty appearance to their smoky environment in a city exclusively burning bituminous coal. Memphis, however, can not be classed as a 'smoky city,' and I am now satisfied that these squirrels came by their colors legitimately, and represent Bachman's Louisiana species, as redefined by Mr. Bangs.

Writing of the migrations of this animal, Mr. Miles informs me: "I have seen them exhausted and wet on the east bank of the Mississippi River, when I know the emigration eastward was taking place on the west bank. About that time I was fishing on a lake in Arkansas and one came by my boat headed from the west to the east bank, looking very unconcerned, with tail curled over back and well out of the wet. I gave pursuit, which he soon noticed, and that tail was then put up on the sail principle and very much increased his speed, I thought at the time, though I overtook and killed him."

**27. *Sciurus hudsonicus* (Erxl.).** Red Squirrel, "Boomer."

Owing to the severe winter of 1894-'5, the "Boomer" was very scarce in its usual haunts on the summit of Roan Mountain. I spent parts of three days in careful search of it and only saw one in the fir belt. Another was seen and captured, during the descent of

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<sup>10</sup> Proc. Bost. Soc. N. Hist., Vol. XXVI, p. 543.

the mountain, at an elevation of 3,500 feet. This species is not seen in Tennessee below an elevation of 2,000 feet, so far as I could ascertain, and the majority live above 4,000 feet. They are unknown on the Cumberland plateau. Lack of suitable specimens prevents me from making the necessary comparisons, but I am suspicious that the Red Squirrels of the Balsam belt of Roan Mountain are a dark, local race of *hudsonicus* which may merit separation from the typical form.

Specimen—Roan Mountain, Carter Co., 1.

**Genus SCIUROPTERUS** F. Cuvier.

**28. Sciuropterus volans** (L.). Southern Flying Squirrel.

From reports of the hunters, and what we know of its distribution in other parts of the United States, this elegant squirrel may be said to be common all over the State of Tennessee from the summit of Roan Mountain to the western "bottoms." Specimens from the highest altitudes would be of interest in determining whether subspecies *sabrinus*, the northern form, is not found there. In the lowlands of Haywood County, Mr. Miles observes that in the evening this species "makes a chattering sound, that sooner or later I hear whenever camped in the woods and don't think I ever miss hearing in clear weather, never in foul weather. Five years ago, in the country, they took possession of my martin box and ran the martins out. I got after them and routed out thirty."

**Order CARNIVORA.**

**Family PROCYONIDÆ.**

**Genus PROCYON** Storr.

**29. Procyon lotor** (L.). Raccoon.

The "Coon" is excessively abundant in the bottoms of West Tennessee and Mr. Miles thinks their numbers there are increasing. In other parts of the State they appear to be well represented.

**Family MUSTELIDÆ.**

**Genus LUTRA** Linnæus.

**30. Lutra hudsonica** Lacép. American Otter.

This fisherman is often seen by hunters at Reelfoot Lake. A specimen was killed at Open Lake, Lauderdale Co. this winter and was seen by Mr. Miles. The otter is a rare but constant inhabitant of all the larger streams in the State.



Genus **LUTREOLA** Wagner.

31. *Lutreola vison* Schreber. Mink.

32. *Lutreola vison vulgivagus* (Bangs). Louisiana Mink.

Only one specimen of mink from Tennessee has passed through my hands. It is a skull of a mink taken at Open Lake in Lauderdale County, by Mr. Miles. This specimen corresponds so closely to Mr. Bangs' diagnosis of *vulgivagus*, as contrasted with typical *vison*, that I am induced to class it with the former, but the cranial differences in *vulgivagus*, however, constant they may have proved, do not appear to me specific. There is little doubt that the minks of eastern Tennessee are typical *vison*.<sup>11</sup>

Specimen—Open Lake, Lauderdale Co., 1.

Genus **PUTORIUS** Cuvier.

33. *Putorius noveboracensis* Emmons. Carolina Weasel.

This weasel is said to be common in West Tennessee, and, from what we know of its general distribution, is nowhere rare. Regarding the possible occurrence of the Canadian Weasel, *Putorius richardsoni cicognani* (Bonap.), in the Smoky Mountains, Mr. Outram Bangs, who has been making a special study of the eastern forms, writes me that *Putorius noveboracensis* is numerous on Roan Mountain but that *cicognani* he has "never seen from any locality south of the lower Hudson Valley, although it may occur in Pennsylvania and West Virginia."

Genus **MUSTELA** Linnaeus.

34. *Mustela pennanti* (Erxl.). Fisher. Pekan.

There is little doubt that the Pekan was long ago exterminated in East Tennessee, as none of the hunters with whom I conversed knew of such an animal. Dr. Merriam includes it among the Alleghenian species not to be found on Roan Mountain in 1887. Audubon and Bachman<sup>12</sup> speak of this animal's occurrence in the State as follows: "We have seen several skins procured in East Tennessee and have heard of at least one individual that was captured near Flat Rock in that State, latitude 35°."

<sup>11</sup> To these may be added *L. vison lutrecephalus* (Harlan) which Mr. Bangs, (Proc. Bos. Soc. Nat. Hist., 1896, pp. 1-6.) considers separable from true *L. vison* of the Boreal zone. The latter Mr. Bangs thinks may range into the higher Alleghenies of North Carolina. On this basis I retain the name as above listed under No. 31.

<sup>12</sup> Quad. N. Amer., I, p. 314.

The Pine Marten, *Mustela americana*, does not seem to have been noted farther south than central Pennsylvania in the Allegheny Range, no records for Tennessee or N. Carolina being extant, to my knowledge.

**Genus MEPHITIS** Cuvier.

**35. Mephitis mephitica elongata** Bangs. Carolina Skunk.

Reported to be rare in the Mississippi lowlands. I rarely detected the signs of this animal in Tennessee, though every one seems to be acquainted with the animal in all localities visited except, perhaps, on the summits of highest mountains.

Mr. Bangs has separated<sup>13</sup> the skunk of the East Canadian fauna from the southern animal, giving the latter a new subspecific name, as above.

**Family URSIDÆ.**

**Genus URSUS** Linnæus.

**36. Ursus americanus** Pallas. American Black Bear.

Bears are now very scarce, even in the wildest territory of the State, but formerly this species was wonderfully plentiful in the canebrakes of West Tennessee. It is difficult to credit the straight forward anecdotes narrated by David Crockett of his experiences with this game in the bottoms of Obion County. On one occasion he killed four bears in one day and 105 in less than one year.

The hunters at Reelfoot Lake, think they are all killed off and say that none have been shot for several years. Mr. Miles writes that "A bear was killed in the west border of Haywood County in 1865—the last one I think—though in Lauderdale County, one is occasionally killed now."

Dr. Merriam found bears in the Great Smoky Mountains in 1887, but I was told that none have been seen on Roan Mountain for several years. On the Cumberland plateau they seem to have been practically exterminated.

**Family CANIDÆ.**

**Genus UROCYON** Baird.

**37. Urocyon cinereoargenteus** (Müll.). Gray Fox.

Found all over the State but said to be supplanted by the Red Fox in western portions, where it is less common than formerly. It

<sup>13</sup> Proc. Bost. Soc. N. Hist., 1895, pp. 1-7.

sometimes courses over the balsam belt of Roan Mountain when pursued by dogs, but does not reside at so great an altitude.

Genus **VULPES** Baird.

38. *Vulpes pensylvanicus* (Bodd.). American Red Fox.

Always numerous in the mountains, the Red Fox has spread with the increasing population into West Tennessee, where it was unknown to the early pioneers. The same conditions are true of the Central Basin and of Middle Kentucky.

Mr. Miles calls it common in his locality now, though it was introduced or migrated thither only forty years ago.

Genus **CANIS** Linnæus.

39. *Canis lupus nubilus* (Say). American Wolf.

In 1887 Dr. Merriam found the wolf still existing in the Smoky Mountains. One was seen during the winter, about the year 1883, near Cloudland Hotel. A few may yet exist in the southern Alleghenies, but they are exceedingly rare.

In Middle Tennessee they seem to be extinct. Their status in the lowlands of West Tennessee may be gathered from the following quotations from letters sent me by Mr. Miles, the first of which was the result of a publication as to the specific identity of black and gray wolves made in *Forest and Stream* for August 31, 1895: "Since the article for *Forest and Stream* was written Major Shaw, an old hunter of this County, tells me that many years since he captured a litter of seven wolf whelps, three of which were gray and four black. \* \* \* Our present wolf is larger and very much fiercer than those of my childhood, at least those specimens were which came under my observation. I suppose our present big gray wolf has always been here and some favorable circumstance must have developed his numbers." In a more recent note Mr. Miles announces the killing of two wolves by poison about the 10th of December, 1895, within seven miles of Brownsville, "by a man who had killed hogs and heard the wolves howling near, when he put out poison with the above result."

Summing up the case for Lauderdale County, Mr. Miles says the "Large Gray" is "common" (!); the "Small Black" is "rare" and the "Yellow Medium, very rare."

**Family FELIDÆ.****Genus LYNX .Kerr.****40. *Lynx rufus* (Guld.). Wild Cat.**

This species is yet numerous in all the wilder tracts of country. It is common in the swamps and bottoms of the western regions.

**41. ? *Lynx canadensis* Kerr. Canada Lynx.**

With no little hesitation, I include this species in the fauna of the Tennessee on the statements of Prof. E.D. Cope.<sup>14</sup> He says: "Like the Red Squirrel, the Canada Lynx extends to the southern limits of the Allegheny ranges, occupying the highest ground, though apparently not so restricted to the elevations as the first named. It is distinguished, by the name catamount, from the *Lynx rufus* which is called wild cat and is well known to the hunters." No cotemporary or previous writer that I have been able to consult, confirms these statements and unless Prof. Cope examined specimens it is probable he was misled by the statements of hunters.

**Genus FELIS Linnæus.****42. *Felis concolor* (L.). Puma, Panther.**

The panther appears to have been exterminated in all parts of the State except the most impassable brakes and "harricanes" of the bottoms of Lauderdale County. This exception is made on the authority of Mr. Miles, who is confident that a few yet exist in that locality.

**Order INSECTIVORA.****Family TALPIDÆ.****Genus SCALOPS.****43. *Scalops aquaticus* (L.). American Mole.**

No moles were captured. Their underground labors in Tennessee were in frequent evidence. It is not probable that any other form of this genus is to be found in the State than the one prevailing in our Middle States.

Mr. Miles reports the mole common in Haywood County "wherever land is rich, and is troublesome in that he burrows in the rows and destroys growing plants, and runs tunnels up and down hill which I have seen in one season wash into gullies 18 inches deep." Any one who has noted the extreme solubility of the agricultural

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<sup>14</sup> Fauna of S. Allegh., Amer. Nat., 1871, p. 395.

soils of West Tennessee and has witnessed the complete destruction of large areas for farming purposes, due to careless tillage and heavy rainfall, will appreciate the significance of this remark.

**Family SORICIDÆ.**

**Genus BLARINA** Gray.

**44. *Blarina brevicauda* (Say).** Northern Blarina.

Specimens from the summit of Roan Mountain correspond closely in size and color to Quebec examples. Those taken at Harriman are appreciably smaller, like specimens from the vicinity of Philadelphia. Bellevue skins and skulls show an exactly intermediate size and character between the northern animal and subspecies *carolinensis*. As in the east, I found this to be the most ubiquitous small mammal of subterranean habits.

Specimens—Bellevue, 1; Sawyer's Springs, 1; Harriman, 4; Roan Mt., Carter Co., 2.

**45. *Blarina brevicauda carolinensis* (Bachman).** Southern Blarina.

The southern mole-shrew inhabits the bottom lands of West Tennessee both in the open and in deep, swampy woods. Typical specimens from the shores of Reelfoot Lake and Wolf River confirm Dr. Merriam's recent (1895) diagnosis of this subspecies in North American Fauna, No. 10. Dr. Merriam records (l. c., p. 14) a specimen from Big Sandy, on the river of same name in Benton County.

Specimens—Samburg, 4; Raleigh, 1.

**46. *Blarina parva* (Say).** Least Blarina.

Prof. Baird records a specimen of what he called *Blarina exilipes* from Brownsville, Tennessee, obtained by Capt. S. Van Vliet. Baird's *exilipes* being proved a synonym of *parva*, I place it as above. Dr. Merriam<sup>15</sup> questions if Baird's record should not have been Brownsville, Texas. No evidence to the contrary being given, and the habitat of *parva* being in the faunal territory occupied by West Tennessee, I feel justified in accepting Baird's record as it stands. I did not secure any of this species, nor can I find other records of its occurrence in the State.

**Genus SOREX** Linnæus.

**47. *Sorex personatus* (Geoff. St. Hil.).** Masked Shrew.

In the deep balsam forests which crown the summit of Roan

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<sup>15</sup> N. Amer. Fauna, No. 10, p. 7.

Mountain this tiny shrew was numerous. Its burrows were found under decaying logs and large stones in moist places along the bridle path leading directly from Cloudland to the Doe River valley.

Specimens—Roan Mt., Carter Co., 4.

**48. *Sorex fumeus* Miller.** Smoky Shrew.

Two specimens of this large *Sorex* were taken on Roan Mountain in similar situations to those frequented by the Masked Shrew. A large number of specimens of both species were taken by Dr. Merriam and his assistants on the North Carolina side of the mountain.

To the painstaking and intelligent studies of my friend Gerrit S. Miller, Jr.<sup>16</sup> we are indebted for the identification and naming of the Smoky Shrew, as well as the simplification of a group of mammals whose identity and nomenclature had become so confused as to be a byword and reproach to American mammalogy.

Specimens—Roan Mt., Carter Co., 2.

Order CHIROPTERA.

Family VESPERTILIONIDÆ.

Genus ATALAPHA Rafinesque.

**49. *Atalapha borealis* (Mull.).** Red Bat.

A few of these bats were noted in the mountains of East Tennessee. None were found in the caves nor in Mammoth Cave. Specimens from Tyree Springs and Knoxville are recorded in the catalogue of the National Museum.

Not having any records of the presence of the Hoary Bat, *Atalapha cinerea*, in the State, it may be mentioned that it is likely to occur either as a migrant or resident anywhere east of the Cumberland plateau.

Genus VESPERTILIO Linnæus.

**50. *Vespertilio lucifugus* (Le C.).** Little Brown Bat.

I am informed by Messrs. Brimley of Raleigh, N. C., that they received four specimens of this bat collected by J. T. Park at Warner, Hickman Co., Tennessee. One was taken in April, another in July, the rest in September.

As Dr. H. Allen has adopted it,<sup>17</sup> this name is subspecifically ap-

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<sup>16</sup> N. Amer. Fauna, No. 10, pp. 38 and 50.

<sup>17</sup> Mon. N. Amer. Bats, 1893, p. 78.

plicable to the little brown bat which he had previously called *subulatus* in the first monograph and to which he now applies (p. 75) the name *gryphus* of F. Cuvier. Taking for granted that his identification and choice of names is correct, we will have to alter their order to accord with sequence of publication, *V. lucifugus* (1831) being the type and *V. lucifugus gryphus* (1832) the subspecies. But I fail to discover that Dr. Allen has indicated in what respect or to what geographical or faunal areas the subspecies in either case shall be distinguished or restricted. The doctor apparently accepts *gryphus* (p. 76, last par.) as "the name of the eastern species," but does not say whether he means *lucifugus* to represent the western form. It is difficult to come to any other conclusion than that he did so intend it, unless the trinomial was used merely to indicate a type of individual variation having no regard to faunal distribution. Cuvier's type of *gryphus* came from New York, Leconte's type of *lucifugus* appears to have come from Georgia. Granting with Dr. Allen that these names were applied to the same species of eastern bat, it is impossible to use either name for any of its geographic subspecies, and hence, Leconte's having priority, Cuvier's name is merely a synonym.

Genus **ADELONYCTERIS** H. Allen.

51. *Adelonycteris fusca* (Beauv.). Brown Bat.

I found this bat abundant in the lowlands. None were seen on the summit of Roan Mountain. Specimens from Hickman County, are recorded by the Messrs. Brimley. It is found on the Cumberland plateau.

Genus **VESPERUGO** Keyserling & Blasius.

52. *Vesperugo carolinensis* (Geoff.). Carolina Bat.

This is a common form in the caves of Kentucky and Tennessee but is not as abundant there as *Vespertilio lucifugus*. Mr. Park took three specimens in Hickman County.

Specimens—Vaughan's Cave, Bellevue, 3.

Genus **NYCTICEJUS** Rafinesque.

53. *Nycticejus humeralis* (Raf.). Rafinesque's Bat.

Five specimens of this animal, taken in Hickman County by Mr. Park in August and September, have been identified by the Messrs. Brimley.

**Genus LASIONYCTERIS** Peters.**54. ?*Lasionycteris noctivagans*** (Le C.). Silvery Bat.

On two occasions it was my opinion that I had seen the Silvery Bat in Tennessee, viz. at Sawyer's Springs and on Roan Mountain. The fluttering, moth-like flight of some of these mountain bats was characteristic of the peculiar movements of *noctivagans*, and on this identification I admit it here with a query. From our knowledge of the wide distribution of this species in North America there is little doubt that it is to be found over the greater part of the State.

## Order PRIMATES.

**Family HOMINIDÆ.****Genus HOMO** Linnaeus.**55. *Homo sapiens americanus*.** North American Indian.

I shall make no apology for including aboriginal Man in a faunal list of the native and feral mammalia of Tennessee. The customary omission of the genus *Homo* from such lists finds no justification in nature or in science.

For accounts of the history, distribution and habits of the native Indian races of Tennessee, the reader is referred to Haywood's *Natural and Aboriginal History of Tennessee*. For the history of their extinction no references are necessary.